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Implementation of the Sleep Treatment and Education Program for Students (STEPS) in Student Registered Nurse Anesthetists

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IMPLEMENTATION OF THE SLEEP TREATMENT AND EDUCATION PROGRAM FOR STUDENTS (STEPS) IN STUDENT REGISTERED NURSE ANESTHETISTS

by

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ABSTRACT

IMPLEMENTATION OF THE SLEEP TREATMENT AND EDUCATION PROGRAM FOR STUDENTS (STEPS) IN STUDENT REGISTERED NURSE ANESTHETISTS

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In the pursuit of graduate level education, student registered nurse anesthetists (SRNAs) undertake curricula requiring an immense investment of time attending didactic classes and clinical training, studying, and completing assignments. The required time commitment combined with the stress accompanying these responsibilities have the potential to leave the SRNA with inadequate time for an optimal amount of sleep, contribute to sleep disturbances, and ultimately result in sleep-related fatigue (SRF). SRF in the SRNA population is a problem because it is imperative for both patient and student safety that SRNAs attain adequate sleep to allow for optimal cognitive function.

This DNP project was a pretest/posttest evaluation of the Sleep Treatment and Education Program for Students (STEPS), a sleep hygiene intervention. This project sought to determine what impact implementation of STEPS has on SRNA sleep-related behaviors, sleep quality, and incidence of SRF, as measured by the Pittsburgh Sleep Quality Index (PSQI). One of three SRNA class cohort was randomly assigned to the control group. As a pretest, the SRNA participants were administered the PSQI. Following the pretest PSQI, the treatment group received the intervention. Posttest reevaluation using the PSQI was conducted one month later in both groups. Data analysis revealed that the implementation of STEPS had no statistically significant effect on SRNA sleep-related behaviors and sleep quality. Though this intervention did not

show statistically significant, some small overall improvements were seen in examining the raw data. Further, PSQI scores indicated only 25% of the second-year and third-year SRNAs had good sleep quality; 75% had poor sleep quality.

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I would like to express my deep gratitude to my committee chair, Dr. Bonnie Harbaugh, for her guidance, knowledge, patience, and support throughout the process of this doctoral project. I would also like to thank my committee members, Dr. Sat Ananda Hayden and Dr. Michong Rayborn. I could not have completed this project without their direction and encouragement. I would like to offer a special thanks to Dr. Franklin C. Brown at the Yale School of Medicine for allowing me to use the STEPS presentation and materials.

DEDICATION

I would like to convey my sincerest appreciation to my fiancé, Brian Monaghan, for his unending patience, love, and support throughout the process of obtaining my Doctor of Nursing Practice degree. Thank you, I could not have done it without you. I would also like to express my gratitude to my parents, my future in-laws, my family, and friends for their support, understanding, and words of encouragement.

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LIST OF ABBREVIATIONS

AACN	American Association of Colleges of Nursing
AANA	American Association of Nurse Anesthetists
ANOVA	Analysis of variance
BAC	Blood alcohol content
COA	Council on Accreditation of Nurse Anesthesia Programs
CRNA	Certified Registered Nurse Anesthetist
DEP	Total sleep deprivation
DNP	Doctor of Nursing Practice
EXT	Sleep-extended
IRB	Institutional Review Board
NAP	Nurse Anesthesia Program
PSQI	Pittsburgh Sleep Quality Index
SHAPS	Sleep Hygiene Awareness and Practices Scale
SHS	Sleep Habits Survey
SPSS	Statistical Package for the Social Sciences
SRF	Sleep-related fatigue
SRNA	Student Registered Nurse Anesthetist
STEPS	The Sleep Treatment and Education Program for Students

CHAPTER I - INTRODUCTION

Background and Significance

Adequate sleep is essential for health and optimal cognitive function (Biddle & Aker, 2011). This fact is particularly pertinent for anesthesia providers. Anesthetic care delivery demands maintenance of constant vigilance and alertness, regardless of procedure duration or difficulty (Gregory & Edsell, 2014). Sleep deficit and fatigue can result from arduous mental and physical stress (Sinha, Singh, & Tewari, 2013). "Fatigue negatively affects performance and is associated with increased risks to patient safety and to the well-being of the anaesthetist" (Gregory & Edsell, 2014, p. 18). As healthcare providers, we have the responsibility of optimally caring for our own bodies and minds so that we can provide our patients with safe, effective care.

In the pursuit of graduate level education, student registered nurse anesthetists (SRNAs) undertake curricula requiring an immense investment of time attending didactic classes and clinical training, studying, and completing assignments. The time commitment required to attend classes, clinicals, study, and complete assignments combined with the stress that accompanies these responsibilities have the potential to leave the SRNA with inadequate time for an optimal amount of sleep, contribute to sleep disturbances, and ultimately result in sleep-related fatigue (SRF). SRF is defined as fatigue that results from a lack of adequate sleep (Biddle & Aker, 2011). SRF in the SRNA population is a problem because it is imperative for both patient and student safety that SRNAs attain adequate sleep to allow for optimal cognitive function.

In 2006, Brown, Buboltz, and Soper developed and enacted the Sleep Treatment and Education Program for Students (STEPS) to address sleep hygiene and improve sleep

quality in university students. Brown et al. (2006) found that sleep hygiene and sleep quality were improved in subjects after presentation of STEPS. STEPS was used as an educational intervention in this Doctor of Nursing Practice (DNP) project.

Problem Statement – Purpose, Clinical Question, and Measurable Objectives

This DNP project sought to determine what impact the implementation of STEPS has on SRNA sleep-related behaviors, sleep quality, and incidence of fatigue, as measured by the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds III, Monk, Berman, & Kupfer, 1988). The clinical question for this project was: In SRNAs, are sleep-related behaviors and sleep quality improved after implementation of STEPS? This project sought to determine what change the implementation of STEPS has on SRNA sleep-related behaviors and sleep quality, as measured by the PSQI.

Needs Assessment

Sleep hygiene and SRF have not been well studied in the Certified Registered Nurse Anesthetist (CRNA) population, yet is an important problem. One study by Biddle and Aker (2011) found that a significant number of CRNAs report experiencing sleep disturbances and SRF. SRNAs' clinical schedules closely approximate the work schedules of CRNAs with the addition of classes. No studies were located in the literature that addressed sleep hygiene in SRNAs, and very few addressed their experience of sleep disturbances and SRF. In a study on stress in SRNAs by Chipas et al. (2012), 32.7% of SRNAs studied experienced sleep disturbance weekly as a symptom of stress. I worked with my DNP project advisor Dr. Everson, the Assistant Program Director of The University of Southern Mississippi (USM) Nurse Anesthesia Program (NAP), who agreed that there is a need for sleep education in the curriculum to address the

wellness aspect the Council on Accreditation of Nurse Anesthesia (COA) Educational Programs requires for SRNAs (COA, 2004). I have observed in my SRNA colleagues and experienced myself that SRNAs do experience sleep disturbances and SRF. The fatigued SRNA poses a threat to their own and their patients' safety.

Theoretical Background

The theoretical framework used to guide this doctoral project was Orem's Theory. "In summary, the concept of self-care limitations expresses a deficit relationship between persistent self-care abilities of persons and the objective demand upon them to engage in self-care or dependent care under the condition that the limitation for engagement in care is health derived or health related" (Renpenning & Taylor, 2003, p. 110). Orem's Theory consists of a composite of three interconnected theories (Renpenning & Taylor, 2003). The first of these theories, the theory of self-care, views self-care as essential for optimal functioning and overall personal well-being (Renpenning & Taylor, 2003). The second theory, the theory of self-care deficit, is used to determine nursing requirements (Renpenning & Taylor, 2003). The third theory, the Nursing Development Conference Group theory of nursing system, focuses on the resultant products of nursing (Renpenning & Taylor, 2003). The conceptual elements of Orem's Theory include:

1. Self-care: human action, deliberately performed by persons for the sake of self in order to regulate one's human functioning
2. Self-care agency: the human capability to give self-care
3. Self-care demands: the summation of the self-care actions that will regulate the human functioning of a person, which, if not performed, will result in death, injury, illness, or deterioration of the state of wellbeing

4. Nursing agency: the human capacity to design, operationalize, and manage nursing systems with and for others in need
5. Self-care deficit: the concept of a deficit relation of self-care agency to self-care demand
6. Conditioning factors: human or environmental entities that *condition* the value of *self-care agency, self-care demand,* and *nursing agency* at points in time (Renpenning & Taylor, 2003, p. 111-113)

In this project, the element of self-care was represented by a SRNA's sleep hygiene habits. The element of self-care agency was intended to be optimized through presentation of STEPS. The element of self-care demands was represented by the information presented in STEPS. In this project, the element of nursing agency was represented by the SRNA author of this project. The element of self-care deficit was represented by sleep in SRNAs. The element of conditioning factors was also represented by the information presented in STEPS. Through integration of Orem's Theory in this DNP project, I sought to accomplish the goals of improved sleep-related behaviors and sleep quality and reduced incidence of SRF in the SRNA population.

DNP Essentials

The DNP essentials comprise eight foundational concepts that must be achieved in order to obtain a DNP degree (American Association of Colleges of Nursing [AACN], 2006). This DNP project meets all eight DNP essentials, which can be located in Appendix A. The three most applicable DNP essentials in this project are essentials II, III, and VII.

DNP essential II is organizational and systems leadership for quality improvement and systems thinking (AACN, 2006). This doctoral project addressed DNP essential II through the implementation of STEPS to potentially improve SRNA sleep-related behaviors, sleep duration, and sleep quality and reduce the incidence of SRF in this population. Reduction of SRF systematically in the SRNA population has the potential to improve patient safety and quality of care through a decrease in incidence of fatigue-related errors.

DNP essential III is clinical scholarship and analytical methods for evidence-based practice (AACN, 2006). This project achieved DNP essential III through the utilization of data gathering and outcomes evaluation using a one-tail paired t-test to assess the difference in mean pretest and posttest PSQI scores as well as conduction of a Cronbach's alpha to establish the reliability of the data (Cronbach, 1951).

DNP essential VII is clinical prevention and population health for improving the nation's health (AACN, 2006). This project addressed DNP essential VII through potential improvement of SRNA sleep practices and improved sleep quality and duration. Learning how to better manage sleep as a SRNA may help now and in the future when the SRNA becomes a CRNA, thus creating a better safety long-term outcome for both the participants and their patients.

Review of Evidence

Search Strategies

While it was not difficult to find many articles related to the major search terms, finding articles specific to sleep in CRNA students was difficult. Searches were

performed in “waves”, trying different ways to yield what was sought after. The Search Engines used to conduct this literature search included Primo and Google Scholar.

An initial search on Google Scholar using the key words *fatigue* and *nurse anesthetists,* publication date range limited to 2000-2017, produced 16,300 results. When limited further to research, and English-only, full-text articles, produced 200 articles, and further filtering for duplicates and articles not related to the topic led to the finding of the seminal article “The national study of sleep-related behaviors of nurse anesthetists: Personal and professional implications” (Biddle & Aker, 2011). Citation tracking from this article led to 3 more pertinent articles, including those by (Gaba & Howard, 2002), (Howard et al., 2003), and (Williamson & Feyer, 2000).

A second comprehensive search on Google Scholar using the key words *sleep, patient safety*, and *anesthesia* with the publication date range limited to 2000-2017 produced 17,900 results. After further limiting to English language, full text, including the search terms *anesthesiologist* and *CRNA* and filtering out duplicates and non-pertinent articles led to the article “The fatigued anesthesiologist: A threat to patient safety?” (Sinha et al., 2013). Citation tracking from this article led to the article “Does our sleep debt affect patients’ safety?” (Tewari, Soliz, Billota, Garg, & Singh, 2011).

A search on Primo using the key words *fatigue* and *anesthetist* with the publication date range limited to 2000-2017 and the results limited to show only peer-reviewed journals produced 752 results, and after removing non-English, duplicate articles, and non-pertinent articles, one article, (Gregory & Edsell, 2014), was found. A second search on Primo using the key words *sleep, treatment, education,* and *students* with the publication date range limited to 2000-2017 and the results limited

to show only peer-reviewed journals produced 15,217 results and led to the article that describes the intervention and evaluation of the STEPS program study. A Google search using the terms *standards* and *nurse anesthesia programs* produced 622,000 results, when accreditation was added to the key terms, and non-pertinent content was eliminated, the "Standards for Accreditation of Nurse Anesthesia Programs" (COA, 2015) was found. A literature matrix summarizing these 9 articles is in Appendix B.

Evidence Review

A national study of sleep-related behaviors of CRNAs was conducted using a descriptive self-report survey (Biddle & Aker, 2011). The survey, developed for the purposes of the study, was mailed to a random sample of 10% of American Association of Nurse Anesthetists (AANA) members (Biddle & Aker, 2011).

> The survey revealed that 50% of CRNAs go to bed after 10 PM each night, 25% have significantly fragmented sleep, 59% awaken prematurely, 47% have difficulty falling asleep, 24% use medications to generate sleep, 18.4% have restless legs syndrome, 56.2% snore, 68% are excessively tired during the day, 0.4% use stimulants (other than caffeine) to maintain wakefulness, 15.7% have experienced sleep-related behavior during a surgical case, and 48.8% have witnessed a colleague asleep during a case. (Biddle & Aker, 2011, p. 324)

Biddle and Aker (2011) found that large numbers of CRNAs experience sleep disturbances and SRF and encourage further study on the matter since SRF in CRNAs has implications in both patient and provider safety.

In 2006, Brown, Buboltz, and Soper developed and enacted STEPS to address sleep hygiene and improve sleep quality in university students. Participants recruited

from two introductory psychology classes were placed in either the control or treatment group. The control and treatment groups completed measurement packets prior to treatment and 6 weeks posttreatment that contained a demographics questionnaire, the PSQI (Buysse et al., 1988), the Sleep Hygiene Awareness and Practices Scale (SHAPS), and the Sleep Habits Survey (SHS). The control group consisted of 95 subjects. Six weeks posttreatment, 66 (69%) subjects (22 men, 44 women) remained. The treatment group consisted of 82 subjects. Six weeks posttreatment, 56 (71%) subjects (28 men, 28 women) remained. Independent sample t-tests were used to compare the baseline PSQI, SHS, and SHAPS scores and demographic composition of the control and treatment groups. The authors utilized repeated-measures analysis of variance (ANOVA) to compare the within-subject changes in PSQI, SHS, and SHAPS scores in both the control and treatment groups. Brown et al. (2006) found that sleep hygiene and sleep quality were significantly improved in subjects after presentation of STEPS.

The COA accredits NAPs in the United States and Puerto Rico and sets the standards NAPs must adhere to maintain accreditation (COA, 2015). Within the *Standards for Accreditation of Nurse Anesthesia Programs*, the COA has set parameters defining a reasonable time commitment for SRNAs. The COA (2015) states:

> A reasonable number of hours to ensure patient safety and promote effective learning should not exceed 64 hours per week. This time commitment includes the sum of the hours spent in class and all clinical hours…averaged over four weeks. Students must have a 10-hour rest period between scheduled clinical duty periods (i.e. assigned continuous clinical hours). At no time may a student provide direct patient care for a period longer than 16 continuous hours. (p. 39)

Gaba and Howard (2002) discussed current and proposed policies regarding health care professionals' work hours and fatigue. It was noted that numerous studies have shown that sleep deprivation and fatigue impair human performance, but that the correlation between sleep deprivation and impaired clinical performance has been more difficult to prove. The current and proposed restrictions on work and on-duty hours in the aviation industry were compared to those of medical residents'. They conclude that "in the United States, medical professionals, especially residents, are working far beyond the limits that society deems acceptable in other sectors" and that "this practice is incompatible with a safe, high-quality health care system" (Gaba & Howard, 2002, p. 1254).

Gregory and Edsell (2014) explored the prevalence, causes, and effects of fatigue in anesthesia providers. They found that international studies report prevalence of fatigue in anesthesia providers that ranges from 17% in the Netherlands to 84% in the United States. Further, they found that the primary causes of fatigue in this population include sleep disturbances and deviation from circadian rhythms due to work schedules. The effect of fatigue on an anesthetist includes cognitive, pathological, physiological, and psychological ramifications. Further, the incidence of medical errors increases with fatigue. Gregory and Edsell (2014) suggest use of organizational, educational, behavioral, and pharmacological strategies to help deal with fatigue and its negative effects on performance.

In a pilot study, researchers used simulation to investigate sleep deprivation and performance, sleepiness, and mood (Howard et al., 2003). The participants consisted of 12 anesthesiology residents who had prior experience with the simulation facility.

Participants were asked to perform a 4-hour anesthetic simulation after each of the 2 experimental conditions of prior sleep: a period of 25-30 hours of total sleep deprivation (DEP) and an additional 2 hours of sleep a day for 4 consecutive days, referred to as sleep-extended (EXT). Howard et al. (2003) found that "psychomotor performance and mood were impaired while subjective sleepiness and sleepy behaviors increased during simulated patient care in the DEP condition" (p. 1345). Overall clinical performance in the simulations were similar in the EXT and DEP conditions (Howard et al., 2003).

A review article (Sinha et al., 2013) explored the physiology and resultant pathology of fatigue, as well as influential and mitigating factors on fatigue. The review of the literature was conducted on anesthesiologists as well as other healthcare specialties. Sinha et al. (2013) proposed that fatigue in anesthesia providers is an urgent issue that has both personal and professional implications. They urge adoption of strategies to ameliorate sleep disturbance and the effects of fatigue in the anesthesia community.

Another review article (Tewari et al., 2011) highlights evidence in the literature pertaining to fatigue in health care workers, anesthesia providers, and patient safety concerns. A growing body of evidence indicates that sleep debt in anesthesiologists has the potential for detrimental patient outcomes. The authors advocated formulation and implementation of guidelines and laws at both the institutional and national level to address sleep issues (Tewari et al., 2011).

A study conducted by Williamson and Feyer (2000) sought to compare the effects of sleep deprivation and alcohol (and associated blood alcohol content [BAC]) on performance. The study's convenience sample was composed of 39 subjects; 30 transport

industry employees and 9 from the Australian army. Findings from the study included that" after 17-19 hours without sleep...performance on some tests was equivalent or worse than that of a BAC of 0.05%", further, "after longer periods without sleep, performance reached levels equivalent to the maximum alcohol dose given to subjects (BAC of 0.1%)" (p. 649). Williamson and Feyer (2000) concluded that "sleep is needed after the end of a day if adverse effects on performance are to be avoided" (p. 654).

Summary

The evidence indicates fatigue in anesthesia providers is an important problem with associated patient safety implications. In order to achieve optimal patient and self-care outcomes, anesthesia providers need to obtain adequate sleep. This doctoral project is needed to educate SRNAs on sleep hygiene and optimal sleep habits so that they may improve their sleep now and in their future careers as CRNAs.

CHAPTER II - METHODOLOGY

This doctoral project sought to determine if the implementation of STEPS reduces the incidence of sleep disturbance and SRF in SRNAs by improving sleep-related behaviors and sleep quality in my clinical arena. The clinical question asked: In SRNAs, are sleep-related behaviors and sleep quality improved after implementation of STEPS? The rigors of nurse anesthesia education lend to stressful situations that may perpetuate sleep disturbance and SRF. It is imperative for both patient and student safety that SRNAs attain adequate sleep to allow for optimal cognitive function. This project helped to identify whether STEPS can be used to improve SRNA sleep-related behaviors and quality of sleep in my clinical cohort and, hopefully, encouraged further use of knowledge gained to increase the safety and health of SRNAs and their patients. A logic model was developed to illustrate the activities and outcomes of this DNP project and can be found in Appendix C. The following sections will address the participants, ethical considerations, project intervention, project design, and data collection.

Participants

In this project, a SRNA was defined as "a registered professional nurse who is enrolled in an educational program that is accredited by the Council for the purpose of acquiring the qualifications necessary to become certified in the specialty of nurse anesthesia" (COA, 2004, p. 33). The participants in this project consisted of a convenience sample of SRNAs enrolled in the USM NAP. Inclusion criteria included enrollment on a full-time basis in USM's NAP and classification as a first-year, second-year, or third-year SRNA. The SRNA author of this project was the only exclusion. All

USM SRNAs meeting the inclusion criteria were asked to participate in the project in order to achieve the largest sample size possible.

The maximum potential sample size for this project was 59 participants. This number accounts for removal of the researcher from the sample pool. An anticipated effect size of 0.9, a desired statistical power level of 0.8, a probability level of 0.05 were used to calculate the minimum required sample size of 42 (Free Statistics Calculators, 2017).

Ethical Considerations

Prior to initiation of the intervention and any data collection, approval from the USM Institutional Review Board (IRB) was sought and obtained (protocol number: 17062604) (see Appendix D). Recruitment of participants was conducted after a scheduled class period. Consent was obtained from the class instructors to speak to my colleagues in the program after their class ended. Informed consent was obtained from all participants prior to initiation of the pretest and intervention. Permission from participants to use de-identified data for present and future publication was obtained. Participants were informed that they were allowed to withdraw from the study at any time. Withdrawal from the study included, but was not limited to, refusal or inability to answer pretest or posttest tools in their entirety and refusal or inability to be physically present for the entirety of the STEPS presentation. The author took every effort to prevent coercion to be in and stay in the study. Participants were insured that their confidentiality would be maintained. Participants were asked to assign themselves a code consisting of a four-digit number and one letter separate from the consent form. The codes were used to compare individual pretest and posttest PSQI scores. The collected

participant data were entered into electronic spreadsheets on a password protected laptop that only the principal investigator had access to. The paper consent forms and PSQI pretests and posttests were locked in a file cabinet that only the principal investigator had access to. The participant data will be kept until 6 months after the study is completed, at which point the files will be permanently deleted and the paperwork shredded.

Project Intervention

Permission to use the STEPS intervention and materials was obtained from the original author of the program (see Appendix E). I consulted with my DNP project advisor to confirm that the STEPS program was a worthwhile instrument to implement in the USM SRNA population. The STEPS intervention consisted of an approximately 30-minute oral and PowerPoint presentation as well as handouts addressing sleep hygiene, stimulus control, and facts about caffeine-containing substances (Brown et al., 2006). The oral presentation involved a script that the presenter read verbatim to the program participants. The presentation explained the purpose of STEPS, described the negative effects of sleep disturbance, and reviewed the Sleep Hygiene Guidelines, Substances with Caffeine, and Stimulus Control Instructions handouts (Brown et al., 2006). The STEPS PowerPoint presentation is located in Appendix F. The STEPS oral presentation can be found in Appendix G. The STEPS handouts given to participants are located in Appendix H.

Project Design

The approach taken in this DNP project was a pretest/posttest evaluation of a sleep hygiene intervention. The three SRNA class cohorts were randomly assigned to

either the treatment group, which contained two class cohorts, or the control group, which contained one class cohort. The first-year SRNA cohort was randomly assigned to the control condition. The second-year and third-year SRNA cohorts were randomly assigned to the treatment condition. As a pretest, the SRNA participants were administered the PSQI. Following the pretest PSQI, the treatment group received the intervention, which consisted of an in-person presentation of STEPS. One month post intervention the SRNA participants in the treatment group were administered the PSQI as a posttest. The SRNA participants in the control group were administered the PSQI pretest and posttest at the same interval as the treatment group but did not receive the intervention.

Data Collection

As a pretest, the SRNA participants in the treatment group were administered the PSQI in pen and paper form prior to initiation of the intervention. The PSQI consists of seven components containing 19 questions the participants self-rate and 5 questions to be rated by a roommate or significant other (Buysse et al., 1988). The latter 5 questions do not affect the score of the PSQI and were omitted from the questionnaire presented to participants. "The 19 self-rated questions assess a wide variety of factors relating to sleep quality, including estimates of sleep duration and latency and of the frequency and severity of specific sleep-related problems" (p. 195). Completion of the PSQI required a 5-10-minute time commitment from the participant. Scores range from 0 to 21, with higher scores indicating progressively poorer sleep quality. Buysse et al. (1988) established that a PSQI score ≤ 5 indicates good sleep quality and a score > 6 indicates

poor sleep quality. “The PSQI has internal consistency and a reliability coefficient (Cronbach’s alpha) of 0.83 for its seven components” (Smyth, 2012, para. 4).

The PSQI was completed in pen and paper form by treatment group participants immediately prior to the STEPS presentation and then again, one month post intervention after a scheduled class period. The SRNA participants in the control group were administered the PSQI pretest and posttest in pen and paper form after a scheduled class period at the same interval as the control group but did not receive the intervention. The first-year SRNA control group and the second-year SRNA treatment group pretest PSQI surveys were collected after scheduled class periods on June 26, 2017. The third-year SRNA treatment group pretest PSQI surveys were collected after a scheduled class period on June 30, 2017. The first-year SRNA control group and the second-year SRNA treatment group posttest PSQI surveys were collected after scheduled class periods on July 24, 2017. The third-year SRNA treatment group posttest PSQI survey was collected after a scheduled class period on July 28, 2017. I scored each individual PSQI by following the PSQI scoring instructions. A copy of the PSQI can be found in Appendix I. The scoring instructions for the PSQI are located in Appendix J.

Summary

The preceding sections addressed the participants, ethical considerations, project intervention, project design, and data collection. The project was carried out as indicated in the above sections. The following chapter presents the results of this project.

CHAPTER III - RESULTS

Data Analysis

The independent variable in this DNP project is the STEPS program intervention. The dependent variables are the mean PSQI scores. After the data were collected and data hygiene was performed, I conducted a Cronbach's alpha to establish the reliability of the data (Cronbach, 1951). The Cronbach's alpha for the pretest PSQI component scores was calculated to be adequate at 0.70. The Cronbach's alpha for the posttest PSQI component scores was calculated to be adequate at 0.76. The Cronbach's alpha for the pretest and posttest global PSQI scores was calculated to be adequate at 0.90. Examination of sample distribution for control and treatment groups showed unimodal symmetric curves with slightly positive skewness. Overall, all samples showed satisfactory approximation of the normal curve; therefore, the decision was made to utilize t-tests for analysis.

One-tailed paired t-tests were utilized to assess the difference in mean pretest and posttest PSQI scores in both the treatment and control groups. The first hypothesis is that there is a statistically significant difference between the mean pretest and posttest global PSQI scores in the treatment group. The second hypothesis is that there is not a significant difference between mean pretest and posttest PSQI scores in the control group. Two-tailed independent group t-test were performed to compare pretest scores in both groups and posttest scores in both groups. The third hypothesis is that there are no significant differences between the pretest results in the treatment and control groups. The fourth hypothesis is that there are no significant differences between the posttest results in the treatment and control groups. A p-value of ≤ 0.05 was selected a priori as the level of significance for analyses. Univariate analysis was utilized to assess

differences in control and treatment group PSQI question responses. Data were analyzed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS).

Results

A total of 52 SRNAs participated in this DNP project. The final sample size was 47 due to submission of incomplete pretest or posttest PSQI surveys. The treatment group consisted of 28 participants. Of the 28 treatment group participants, 53.57% (n = 15) were female and 46.43% (n = 13) were male. Sixteen (57.14%) treatment group respondents were age 18-29, 11 (39.29%) were age 30-39, and 1 (3.57%) was age 40-49. The control group consisted of 19 participants. Of the 19 control group participants, 31.58% (n = 6) were female and 68.42% (n = 13) were male. Fourteen (73.68%) control group respondents were age 18-29 and 5 (26.32%) were age 30-39.

A paired samples t-test was conducted to compare the mean pretest and posttest PSQI scores in the treatment group. In testing hypothesis one, there was not a significant difference in the scores for pretest PSQI (M = 8.25, SD = 2.95) and posttest PSQI scores (M = 8.00, SD = 3.66) in the treatment condition; $t(27) = 0.535$, $p = 0.299$, $d^b = 0.08$. This means that there is insufficient evidence to conclude that there is a statistically significant difference between the mean pretest and posttest global PSQI scores in the treatment group. See Table 1.

A paired samples t-test was conducted to compare the mean pretest and posttest PSQI scores in the control group. In testing hypothesis two, there was not a significant difference in the scores for pretest PSQI (M = 7.21, SD = 4.09) and posttest PSQI scores (M = 6.58, SD = 3.88) in the control condition; $t(18) = 1.583$, $p = 0.065$, $d^b = 0.16$. This means that there is sufficient evidence to conclude that there is not

a significant difference between mean pretest and posttest PSQI scores in the control group. See Table 1.

Table 1

Paired t-test Comparisons Between Pretest and Posttest PSQI Scores

Group	Pretest Mean (SD)	Posttest Mean (SD)	t	df	p	Cohen's d
Treatment	8.25 (2.95)	8.0 (3.66)	0.535	27	0.299	0.08
Control	7.21 (4.09)	6.58 (3.88)	1.583	18	0.065	0.16

To test the third hypothesis, a 2-tailed independent group t-test was performed between the control and treatment groups to determine differences in pretest scores. Levine's test revealed unequal variances were present between the groups. The independent group t-test revealed that the treatment group (M = 8.25, SD = 2.95) was not significantly different from the control group (M= 7.21, SD = 4.09), $t(46) = 0.95$, $p = 0.35$, $d^b = 0.31$. See Table 2.

To test the fourth hypothesis, a 2-tailed independent group t-test was performed between the control and treatment groups to determine differences in posttest scores. Levine's test revealed unequal variances were present between the groups. The independent group t-test revealed that the treatment group (M = 8.0, SD = 3.66) was not significantly different from the control group (M = 6.58, SD = 3.88), $t(46) = 1.26$, $p = 0.22$, $d^b = 0.39$. See Table 2.

Table 2

Independent Group t-test Comparisons Between Treatment and Control PSQI Scores

Test	Treatment Mean (SD)	Control Mean (SD)	t	df	p	Cohen's d
Pretest	8.25 (2.95)	7.21 (4.09)	0.95	46	0.35	0.31
Posttest	8.0 (3.66)	6.58 (3.88)	1.26	46	0.22	0.39

Univariate analysis was utilized to assess differences in control and treatment group PSQI question responses. See Table 3. Question 1 on the PSQI asks when during the past month has the participant usually gone to bed at night. The majority (96.43%, n = 27) of both pretest and posttest treatment group participants and 89.47% (n = 17) of pretest control and 84.21% (n = 16) of posttest control group participants reported bedtimes of 2001-0000. Question 2 on the PSQI asks how long it usually takes the participant to fall asleep each night over the past month. The majority of participants in both the control and treatment groups took ≤ 30 minutes to fall asleep: the pretest treatment group reported 78.58% (n = 22) and the pretest control group reported 84.21% (n = 16). For the posttests, the treatment group reported 82.14% (n = 23) and the control group reported 84.21% (n = 16) of respondents took ≤ 30 minutes to fall asleep.

Question 3 on the PSQI asks when over the past month the participant usually wakes up in the morning. The treatment group mostly reported 0401-0600 (pretest 89.29%, n = 25; posttest 71.43%, n = 20), while the control group reported that some woke up between 0401-0600 (pretest and posttest 36.84%, n = 7) and most woke later, between 0601-0800 (pretest and posttest 47.37%, n = 9). Question 4 on the PSQI asks how many hours of sleep were achieved at night over the past month. The majority of control group participants reported getting more than 7 hours of sleep per night: control

pretest = 42.11% (n = 8) and control posttest = 47.37% (n = 9). The rest of the control group reported fewer than 7 hours of sleep per night. In the treatment group pretest and posttest, approximately 64.29% (n = 18) reported 5-6 hours of sleep per night.

Question 5(a) on the PSQI asks how often during the past month has the participant had trouble sleeping because they cannot get to sleep within 30 minutes. About 35.71% (n = 10) in the pretest treatment group compared to 28.57% (n = 8) in the posttest treatment group reported not being able to get to sleep within 30 minutes was a problem about once or twice a week, with similar results for the control group (pretest 36.84%, n = 7; posttest 26.32%, n = 5). It was apparent that the treatment group pretest and posttest reported higher incidence of being unable to fall asleep within 30 minutes 3 or more times a week (pretest 28.57%, n = 8; posttest 14.29%, n = 4) compared to the control group (pretest and posttest 10.53%, n = 2). Question 5(b) on the PSQI asks how often during the past month the participant has had trouble sleeping because they wake up in the middle of the night or early morning. Responses to the question asking if sleeping was troubled by waking in the night or early morning revealed the pretest treatment group as having trouble 3 or more times a week (42.86%, n = 12) versus a posttest decline to 21.43% (n = 6). Similarly, the control group values declined from pretest 36.84% (n = 7) to posttest 15.79% (n = 3).

Question 5(c) on the PSQI asks how often during the past month has the participant had trouble sleeping because they have to get up to use the bathroom. Not having to go to the bathroom at night or less than once a week garnered the most responses from the posttest treatment group (75.00%, n = 21), increasing from the pretest responses of 50% (n = 14). Question 5(d) on the PSQI asks how often during the past

month has the participant had trouble sleeping because they cannot breathe comfortably. Breathing problems did not appear to be a problem for many in either the treatment (pretest 96.43%, n = 27; posttest 92.86%, n = 26) or control groups (pretest 84.21%, n = 16; posttest 78.95%, n = 15). Question 5(e) on the PSQI asks how often during the past month has the participant had trouble sleeping because they cough or snore loudly. Coughing and snoring did not appear to be a very frequent problem for any group, with 70% to 85% of participants having reported no trouble during the past month or trouble less than once a week.

Question 5(f) on the PSQI asks how often during the past month has the participant had trouble sleeping because they felt too cold. Most respondents in both groups did not report that being too cold interrupted their sleep more than once a week, with the most frequent response being that it had not happened in the past month (57.14% to 75.00%). Question 5(g) on the PSQI asks how often during the past month has the participant had trouble sleeping because they felt too hot. Feeling too hot as a source of sleep problems did not show to be occurring much during the past month; however, there was an overall decline between pretest (42.86%, n = 12) and posttest (28.57%, n = 8) in the treatment group, but not in the control group pretest (26.32%, n = 5) and posttest (26.32%, n = 5).

Question 5(h) on the PSQI asks how often during the past month has the participant had trouble sleeping because they had bad dreams. Bad dreams as a source of sleep problems were reported by the majority as not occurring during the past month or occurring less than once a week across all groups. In the treatment group, the reported incidence of bad dreams less than once a week or not during the past month increased

slightly from the pretest (92.86%, n = 26) to posttest (96.43%, n = 27), yet declined slightly in the control group from pretest (89.47%, n = 17) to posttest (78.95%, n = 15). Question 5(i) on the PSQI asks how often during the past month has the participant had trouble sleeping because they had pain. As with bad dreams, pain did not show to be a frequent sleep problem for the majority of respondents; however, the reported incidence declined to less than once a week or not during the past month from pretest to posttest in the treatment (pretest 85.71%, n = 24; posttest 96.43%, n = 27) and control groups (pretest 84.21%, n = 16; posttest 89.47%, n = 17).

Question 5(j) on the PSQI asks how often during the past month has the participant had trouble sleeping because of other reasons for sleep difficulties and for a description if applicable. Participants indicated what other reasons caused problems in their sleep, with 25.00% (n = 7) in the pretest treatment group and 17.85% (n = 5) in the posttest treatment group reporting these occurred at least once or twice a week or more. Pretest treatment group respondents cited the following "other" reasons for sleep difficulties: class assignments, family issues, pets, spouse's irregular schedule, and roommate noise. Posttest treatment group respondents cited the following "other" reasons for sleep difficulties: anxiety about cases in clinical the following day, pets, spouse, and irregular sleep schedule. In the control group, the frequencies for other sleep difficulties at least once or twice a week or more were 42.11% (n = 8) for the pretest and 21.05% (n = 4) for the posttest. Pretest control group respondents cited the following "other" reasons for sleep difficulties: stress, exams, racing thoughts, restlessness, weather, 1 year old child waking up, anxiety, and tossing and turning in the middle of the night. Posttest control group respondents cited the following "other" reasons for sleep difficulties:

inability to clear their head, medications, screaming neighbors, relentless thoughts, and pets. As indicated for both the control and treatment groups, the values declined from pretest to posttest, indicating a decline in these "other" sleep problems over the 1 month period.

Question 6 on the PSQI asks the participant to rate their overall sleep quality over the past month. In rating sleep quality, most respondents in all groups indicated that they thought their sleep quality was fairly good. However, the treatment group rated their sleep quality lower than the control group. Further, there was a decline in pretest and posttest values in the treatment group, with a greater incidence of bad ratings at posttest (28.57%, n = 8) than at pretest (17.86%, n = 5). The control group showed relative stability from pretest to posttest.

Question 7 on the PSQI asks how often during the past month the participant has taken medicine (prescribed or "over the counter") to help them sleep. The majority of participants reported taking no medications to help them sleep over the past month in both the pretest and posttest treatment and control groups. The treatment group showed an increase in medication use from pretest (35.71%, n = 10) to posttest (42.86%, n = 12), showing some students increased taking sleep aid medication from not during the past month to less than once a week.

Question 8 on the PSQI asks how often during the past month has the participant had trouble staying awake while driving, eating meals, or engaging in social activities. Participants reported not having trouble staying awake over the past month most frequently in both groups, with the second most frequent response being less than once a week. More participants indicated in both the pretest (25.00%, n = 7) and posttest

(21.43%, n = 6) of the treatment group that they had trouble staying awake from once to three or more times a week when compared to the control group pretest (21.06%, n = 4) and posttest (15.79%, n = 3).

Question 9 on the PSQI asks how much of a problem over the past month has it been for the participant to keep up enough enthusiasm to get things done. Keeping enthusiasm up was reported as a slight to somewhat of a problem for most respondents in all groups across the pretests to posttests. Maintaining enthusiasm was reported as a big problem consistently in the treatment group from pretest (14.29%, n = 4) to posttest (14.29%, n = 4). In the control group, results indicated an improvement in frequency of participants who experienced a big problem maintaining enthusiasm from pretest (21.05%, n = 4) to posttest (10.53%, n = 2).

Table 3

Pretest and Posttest PSQI Frequencies by Group and Question

Question	Group							
	Treatment Pretest		Treatment Posttest		Control Pretest		Control Posttest	
	%	n	%	n	%	n	%	n
1. During the past month, when have you usually gone to bed at night?								
1801-2000			3.57	1	5.26	1	5.26	1
2001-2200	39.29	11	53.57	15	31.58	6	21.05	4
2201-0000	57.14	16	42.86	12	57.89	11	63.16	12
0001-0200					5.26	1	10.53	2
0601-0800	3.57	1						
2. During the past month, how long (in minutes) does it usually take you to fall asleep each night?								
≤ 15 min	39.29	11	28.57	8	52.63	10	36.84	7
16-30 min	39.29	11	53.57	15	31.58	6	47.37	9
31-60 min	17.86	5	17.86	5	15.79	3	15.79	3
>60 min	3.57	1	0.00	0	0.00	0	0.00	0
3. During the past month, when do you usually wake up in the morning?								
0201-0400	3.57	1	14.29	4	5.26	1	5.26	1
0401-0600	89.29	25	71.43	20	36.84	7	36.84	7
0601-0800	3.57	1	7.14	2	47.37	9	47.37	9
0801-1000			7.14	2	10.53	2	5.26	1
1001-1200							5.26	1
1401-1600	3.57	1						
4.During the past month, how many hours of actual sleep did you get at night?								
>7 hrs	7.14	2	14.29	4	42.11	8	47.37	9
>6-7 hrs	21.43	6	17.86	5	21.05	4	31.58	6
5-6 hrs	64.29	18	64.29	18	31.58	6	15.79	3
<5 hrs	7.14	2	3.57	1	5.26	1	5.26	1

Table 3 (continued)

5(a). During the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes?								
Not during the past month	14.29	4	25.00	7	26.32	5	21.05	4
Less than once a week	21.43	6	32.14	9	26.32	5	42.11	8
Once or twice a week	35.71	10	28.57	8	36.84	7	26.32	5
Three or more times a week	28.57	8	14.29	4	10.53	2	10.53	2
5(b). During the past month, how often have you had trouble sleeping because you Wake up in the middle of the night or early morning?								
Not during the past month	14.29	4	7.14	2	15.79	3	10.53	2
Less than once a week	17.86	5	35.71	10	21.05	4	31.58	6
Once or twice a week	25.00	7	35.71	10	26.32	5	42.11	8
Three or more times a week	42.86	12	21.43	6	36.84	7	15.79	3
5(c). During the past month, how often have you had trouble sleeping because you have to get up to use the bathroom?								
Not during the past month	21.43	6	28.57	8	42.11	8	42.11	8
Less than once a week	28.57	8	46.43	13	31.58	6	21.05	4
Once or twice a week	28.57	8	10.71	3	0.00	0	21.05	4
Three or more times a week	21.43	6	14.29	4	26.32	5	15.79	3

Table 3 (continued)

5(d). During the past month, how often have you had trouble sleeping because you cannot breathe comfortably?								
Not during the past month	96.43	27	92.86	26	84.21	16	78.95	15
Less than once a week	3.57	1	3.57	1	10.53	2	15.79	3
Once or twice a week	0.00	0	3.57	1	5.26	1	0.00	0
Three or more times a week	0.00	0	0.00	0	0.00	0	5.26	1
5(e). During the past month, how often have you had trouble sleeping because you cough or snore loudly?								
Not during the past month	71.43	20	60.71	17	68.42	13	68.42	13
Less than once a week	10.71	3	25.00	7	10.53	2	5.26	1
Once or twice a week	10.71	3	7.14	2	0.00	0	5.26	1
Three or more times a week	7.14	2	7.14	2	21.05	4	21.05	4
5(f). During the past month, how often have you had trouble sleeping because you feel too cold?								
Not during the past month	75.00	21	57.14	16	57.89	11	68.42	13
Less than once a week	25.00	7	35.71	10	10.53	2	15.79	3
Once or twice a week	0.00	0	7.14	2	10.53	2	5.26	1
Three or more times a week	0.00	0	0.00	0	21.05	4	10.53	2

Table 3 (continued)

5(g). During the past month, how often have you had trouble sleeping because you feel too hot?								
Not during the past month	42.86	12	28.57	8	26.32	5	26.32	5
Less than once a week	32.14	9	35.71	10	5.26	1	36.84	7
Once or twice a week	17.86	5	28.57	8	36.84	7	15.79	3
Three or more times a week	7.14	2	7.14	2	31.58	6	21.05	4
5(h). During the past month, how often have you had trouble sleeping because you had bad dreams?								
Not during the past month	64.29	18	57.14	16	68.42	13	42.11	8
Less than once a week	28.57	8	39.29	11	21.05	4	36.84	7
Once or twice a week	7.14	2	3.57	1	5.26	1	15.79	3
Three or more times a week	0.00	0	0.00	0	5.26	1	5.26	1
5(i). During the past month, how often have you had trouble sleeping because you have pain?								
Not during the past month	60.71	17	75.00	21	73.68	14	89.47	17
Less than once a week	25.00	7	21.43	6	10.53	2	0.00	0
Once or twice a week	10.71	3	0.00	0	10.53	2	0.00	0
Three or more times a week	3.57	1	3.57	1	5.26	1	10.53	2

Table 3 (continued)

5(j). During the past month, how often have you had trouble sleeping because of other reasons for sleep difficulties?								
Not during the past month	71.43	20	78.57	22	52.63	10	78.95	15
Less than once a week	3.57	1	3.57	1	5.26	1	0.00	0
Once or twice a week	10.71	3	7.14	2	15.79	3	5.26	1
Three or more times a week	14.29	4	10.71	3	26.32	5	15.79	3
6. During the past month, how would you rate your sleep quality overall?								
Very good	10.71	3	17.86	5	21.05	4	21.05	4
Fairly good	71.43	20	53.57	15	68.42	13	68.42	13
Fairly bad	14.29	4	21.43	6	5.26	1	5.26	1
Very bad	3.57	1	7.14	2	5.26	1	5.26	1
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?								
Not during the past month	64.29	18	57.14	16	68.42	13	73.68	14
Less than once a week	14.29	4	21.43	6	5.26	1	5.26	1
Once or twice a week	10.71	3	7.14	2	5.26	1	10.53	2
Three or more times a week	10.71	3	14.29	4	21.05	4	10.53	2

Table 3 (continued)

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activities?								
Not during the past month	39.29	11	42.86	12	68.42	13	73.68	14
Less than once a week	35.71	10	35.71	10	10.53	2	10.53	2
Once or twice a week	14.29	4	21.43	6	10.53	2	5.26	1
Three or more times a week	10.71	3	0.00	0	10.53	2	10.53	2
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?								
No problem at all	10.71	3	21.43	6	10.53	2	21.05	4
Slight problem	39.29	11	42.86	12	47.37	9	47.37	9
Somewhat of a problem	35.71	10	21.43	6	21.05	4	21.05	4
Big problem	14.29	4	14.29	4	21.05	4	10.53	2

Based on the PSQI cutoff scores of > 6 representing poor sleep quality and ≤ 5 representing good sleep quality, 25.00% (n = 7) of the pretest treatment group reported good sleep quality and 75.00% (n = 21) of the pretest treatment group reported bad sleep quality. The posttest treatment group sleep quality remained constant, with 25.00% (n = 7) reporting good sleep quality and 75.00% (n = 21) reporting bad sleep quality. The pretest control group reported 36.84% (n = 7) of participants experienced good sleep quality and 63.16% (n = 12) of participants experienced bad sleep quality. The posttest control group sleep quality showed slight improvement, with 47.37% (n = 9) reporting good sleep quality and 52.63% (n = 10) reporting bad sleep quality. See Table 4.

Table 4

Pretest and Posttest Quality of Sleep

Category	Group							
	Treatment Pretest		Treatment Posttest		Control Pretest		Control Posttest	
	%	n	%	n	%	n	%	n
Good Sleep Quality	25.00	7	25.00	7	36.84	7	47.37	9
Bad Sleep Quality	75.00	21	75.00	21	63.16	12	52.63	10

Summary

The preceding sections addressed the analysis of data and results of this project. Data were analyzed using both Microsoft Excel and SPSS. The following chapter presents interpretation of the results of this project, limitations, and future project and practice implications.

CHAPTER IV – DISCUSSION

Interpretation of Results

The comparison between control and treatment groups pretest and posttests showed no significant differences between the groups (hypotheses 3 and 4) indicating similarity between where each group started and finished. If the treatment had been effective, we would have expected a significant difference at the posttest. At posttest, both the treatment and control groups showed slight improvements, but only the control group approached significance at $p = 0.065$.

The results showed from pretest to posttest that the control group's sleep habits and sleep quality changed more than the treatment group. I think there are multiple possible explanations for this finding. The PSQI pretest may have had a latent effect on the control group participants and got them thinking more about their sleep habits and improving them. I think that the control group changed more than the treatment group because the control group participants have not yet entered into the clinical phase of the program and have less disrupted sleep as such. The pretest treatment group had worse sleep habits than the pretest control group to begin with, so it may have been easier for the control group to improve their sleep habits.

While the results did not prove to be statistically significant, they have clinical significance and great deal can be learned about this population from the information in the raw frequencies. Only 7.14% ($n = 2$) of the pretest treatment group and 14.29% ($n = 4$) of the posttest treatment group reported getting more than 7 hours of sleep per night over the past month. The percentage of respondents in the treatment group that reported getting more than 7 hours of sleep per night was significantly less than the 42.11% ($n =$

8) of the pretest control group and 47.37% (n = 9) of the posttest control group that reported more than 7 hours of sleep per night over the past month. Optimal sleep requirements range between 7 and 9 hours a day (Gregory & Edsell, 2014). These results show that the vast majority of all groups are not achieving the amount of recommended sleep per night.

Waking up in the middle of the night or early morning were shown to be a significant cause of sleep pattern disturbances in the sample, with 42.86% (n = 12) of the pretest treatment group and 36.84% (n = 7) of the pretest control group reporting this problem. It is unknown whether this sleep disturbance was a function of stress, irregular sleep patterns from varying class and/or clinical schedules, or a combination of factors. Both the posttest treatment (21.43%, n = 6) and control groups (15.79%, n = 3) showed a decline in incidence of trouble sleeping from waking up in the middle of the night three or more times a week.

While factors such as feeling too cold, too hot, or having pain at night did not prove to be significant contributors to sleep troubles in the majority of this population, they are factors that could be easily controlled and could help decrease the incidence of troubled sleep in the participants who have difficulties due to these problems. The "other" reasons for sleep difficulties reported by participants which included class assignments, family issues, pets, spouse's irregular schedule, roommate noise, stress, exams, racing thoughts, restlessness, weather, 1 year old child waking up, anxiety, tossing and turning in the middle of the night, anxiety about cases in clinical the following day, spouse, irregular sleep schedule, inability to clear their head, medications, screaming neighbors, and relentless thoughts consisted primarily of factors outside of one's control. They do,

however, give us a more detailed insight into the problems faced by SRNAs that cause sleep disturbances.

I found it interesting that the majority of respondents across both groups indicated that they thought their sleep was fairly good, while sleep quality as indicated by their global PSQI scores revealed that only 25.00% (n = 7) of the treatment group reported good sleep quality and 75.00% (n = 21) of the treatment group reported bad sleep quality on both the pretest and posttest and the pretest control group reported 36.84% (n = 7) of participants experienced good sleep quality and 63.16% (n = 12) of participants experienced bad sleep quality. The posttest control group sleep quality showed slight improvement, with 47.37% (n = 9) reporting good sleep quality and 52.63% (n = 10) reporting bad sleep quality. These data show a stark discrepancy between self-assessment and PSQI assessment of sleep quality and begs the question which assessment is more accurate?

A frightening revelation from the raw data revealed that 60.71% (n = 17) of the pretest treatment group reported having trouble staying awake while driving, eating meals, or engaging in social activities from less than once a week up to three or more times a week. This declined only slightly to 57.14% (n = 16) in the posttest treatment group. This showed that the overwhelming majority of the treatment group, who were all in the clinical phase of the program, had trouble staying awake not only in mundane activities like eating meals, but also activities that require more vigilance for safety, such as driving. Because participants reported having trouble in the listed activities, it is easy to ascertain that they may also experience trouble staying awake while providing patient care in clinicals.

Limitations

Limitations were present in this DNP project. The use of a convenience sample increased the risk of bias in this project. Keeping this in mind, this project's results may not be reflective of results in the greater SRNA population across the United States.

Future Project and Practice Implications

The results of this doctoral project will be disseminated in a number of ways. Initially, the results will be presented to my committee chair, committee members, and USM College of Nursing audience in my formal project defense. After a successful defense, the full text including results from this doctoral project will be available on the Aquilla database. The results will be emailed to all current USM NAP SRNAs as well as the author of STEPS. The results will also be brought to my DNP advisor, Dr. Everson, and NAP administration for consideration of curriculum implications for future students.

The one month timeline for posttest reassessment may have negatively affected the results. The authors of STEPS, Brown et al. (2006), utilized a 6-week interval between intervention and posttest reassessment in their original study. Future projects implementing this intervention might extend the time period between intervention and posttest reassessment to 6 weeks or longer.

I think that the timing in the curriculum that the STEPS intervention is presented may matter. It is evident from the univariate analysis that the first-year students had better sleep habits than the second-year and third-year students. The STEPS intervention might be better presented to the first-year students so that they may develop healthy sleep habits before they begin the clinical phase of the program. However, the STEPS

intervention is highly needed in the second-year and third-year students who displayed higher rates of poor sleep quality.

The timing of measurement may have had an effect on the results. The pretest PSQI surveys were administered to all cohorts in the middle of a Summer semester. The posttest PSQI surveys were administered at the end of the Summer semester when students were preparing for their final exams. The additional stress from final exams may have altered the posttest results. Conducting posttest assessment at a time farther away from final exams might provide truer results. A larger sample size might also have helped to show enough change in the treatment group to prove significant.

It is possible that the STEPS intervention did not prove to be an effective measure to decrease the incidence of SRF in SRNAs because it was not reinforced. Future projects might implement delivery of recurring electronic reminders via email to be mindful of healthy sleep habits and the importance of adequate sleep. Delivery of reminders via text message might also improve effectiveness.

SRF in the SRNA population is a problem because it is imperative for both patient and student safety that SRNAs attain adequate sleep to allow for optimal cognitive function. SRNAs who are provided information on sleep hygiene, substances that contain caffeine, and stimulus control can have a better understanding of how to recognize positive and negative influences on sleep and sleep quality. Future projects should be conducted in order to decrease the incidence of SRF in SRNAs to see if design and intervention changes can improve the results.

Conclusion

The purpose of this DNP project was to determine if the implementation of STEPS reduces the incidence of sleep disturbance and SRF in SRNAs by improving sleep-related behaviors and sleep quality in my clinical arena. Data analysis led to the conclusion that the implementation of STEPS had no statistically significant effect on SRNA sleep-related behaviors and sleep quality, as measured by the PSQI. Though this intervention did not show statistically significant, some small overall improvements were seen in examining and comparing the raw frequencies. Further, close examination of the univariate data provided insight useful to USM NAP administration when implementing curriculum, including clinical scheduling.

APPENDIX A – DNP Essentials

DNP Essentials	How the Essential is Achieved
I. Scientific Underpinnings for Practice	This project addresses DNP essential I by acknowledging that SRF in the SRNA population is a serious problem because it is imperative for both patient and student safety that SRNAs attain adequate sleep to allow for optimal cognitive function.
II. Organizational and Systems Leadership for Quality Improvement and Systems Thinking	This project addresses DNP essential II through the implementation of STEPS to potentially improve SRNA sleep-related behaviors, sleep duration, and sleep quality and reduce the incidence of SRF in this population. Reduction of SRF in the SRNA population has the potential to improve patient safety through a decrease in incidence of fatigue-related errors.
III. Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This project achieves DNP essential III through the utilization of a paired t-test to assess the difference in mean pretest and posttest PSQI scores as well as conduction of a Cronbach's alpha to establish the reliability of the data.
IV. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	This project addresses DNP essential IV through conduction of an extensive electronic evidence review for relevant scholarly articles.
V. Health Care Policy for Advocacy in Health Care	This project meets DNP essential V through dissemination of results to all current USM SRNAs as well as the NAP administration for consideration of curriculum implications for future SRNAs.
VI. Interprofessional Collaboration for Improving Patient and Population Health Outcomes	This project achieves DNP essential VI by equipping SRNAs with knowledge they can share to help improve sleep habits and quality of sleep of other healthcare professionals. Decreased SRF in healthcare providers will improve population health and potentially prevent fatigue-related errors during patient care.
VII. Clinical Prevention and Population Health for Improving the Nation's Health	This project addresses DNP essential VII through potential improvement of SRNA sleep practices and improved sleep quality and duration.
VIII. Advanced Nursing Practice	This project achieves DNP essential VIII by focusing on the population of SRNAs, who will soon enter and affect the field of advanced nursing practice.

APPENDIX B – Literature Matrix

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Biddle, C., & Aker, J. (2011). The national study of sleep-related behaviors of nurse anesthetists: Personal and professional implications. *AANA Journal*, 79(4), 324-331. Retrieved from http://www.aana.com/aanajournalonline.aspx	Level III Grade C	Nonexperimental descriptive cross-sectional survey	"An anonymous survey was mailed to 10% of active CRNAs; 1,284 (41%) completed surveys were returned" (Biddle & Aker, 2011, p. 324).	"The survey revealed that 50% of CRNAs go to bed after 10 PM each night, 25% have significantly fragmented sleep, 59% awaken prematurely, 47% have difficulty falling asleep, 24% use medications to generate sleep, 18.4% have restless legs syndrome, 56.2% snore, 68% are excessively tired during the day, 0.4% use stimulants (other than caffeine) to maintain wakefulness, 15.7% have experienced sleep-related behavior during a surgical case, and 48.8% have witnessed a colleague asleep during a case" (Biddle & Aker, 2011, p. 324).	Biddle & Aker (2011) "believe the issues concerning postgraduate anesthesia provider rest and work hours represent an opportunity to study in greater detail CRNA roles, responsibilities, and work-life balance" (p. 330).

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Brown, F. C., Buboltz, W. C., & Soper, B. (2006). Development and evaluation of the sleep treatment and education program for students (STEPS). *Journal of American College Health*, 54(4), 231-237. http://dx.doi.org/DOI: 10.3200/JACH.54.4.231-237	Level IIA Grade B	Double-blind repeated-measures experimental design	"We recruited participants from 2 large introductory psychology classes at a mid-sized university in the southern United States, with the prior approval of the university human subjects committee" (Brown et al., 2006, p. 233). "The control condition initially consisted of 95 participants. At 6 weeks posttreatment, 66 (69%) of the original participants (22 men, 44 women) remained" (Brown et al., 2006, p. 232). "The treatment condition initially consisted of 82 participants. At 6 weeks posttreatment, 56 (71%) of the original participants (28 men, 28 women) remained" (Brown et al., 2006, p. 232). The control and treatment groups completed measurement packets prior to treatment and 6 weeks posttreatment that contained a demographics questionnaire, the Pittsburgh Sleep Quality Index (PSQI), the Sleep Hygiene Awareness and Practices Scale (SHAPS), and the Sleep Habits Survey (SHS) (Brown et al., 2006).	"The greatest impact of the program, when looking at effect sizes (η2), was on sleep hygiene practices. Students in the treatment group took fewer naps, went to bed hungry less frequently, and took fewer medications with caffeine 6 weeks after the intervention" (Brown et al., 2006, p. 235). "Overall sleep quality in the treatment group also improved over time. Students in the treatment condition demonstrated significantly shorter sleep onset time and fewer sleep disturbances" (Brown et al., 2006, p. 235).	"In summary, these results suggest that the inclusion of a psychoeducational program, such as STEPS in university orientation classes may significantly reduce student sleep difficulties and improve sleep habits" (Brown et al., 2006, p. 236).

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Council on Accreditation of Nurse Anesthesia Educational Programs. (2015). Standards for accreditation of nurse anesthesia programs practice doctorate. Retrieved from http://home.coa.us.com/accreditation/Documents/Standards%20for%20Accreditation%20of%20Nurse%20Anesthesia%20Programs%20-%20Practice%20Doctorate,%20revised%20October%202015.pdf	Level IV Grade D	Expert opinion	N/A	N/A	"A reasonable number of hours to ensure patient safety and promote effective learning should not exceed 64 hours per week. This time commitment includes the sum of the hours spent in class and all clinical hours…averaged over four weeks. Students must have a 10 hour rest period between scheduled clinical duty periods (i.e. assigned continuous clinical hours). At no time may a student provide direct patient care for a period longer than 16 continuous hours" (COA, 2015, p. 39).

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Gaba, D. M., & Howard, S. K. (2002). Fatigue among clinicians and the safety of patients. *The New England Journal of Medicine* , 347(16), 1249-1255. http://dx.doi.org/10.1056/NEJMsa020846	Level IV Grade D	Commentary/expert opinion	N/A	"In the United States, medical professionals, especially residents, are working far beyond the limits that society deems acceptable in other sectors. This practice is incompatible with a safe, high-quality health care system" (Gaba & Howard, 2002, p. 1254).	"An integrated program of measures to prevent excessive hours of work and sleep deprivation should be adopted" (Gaba & Howard, 2002, p. 1254).
Gregory, P., & Edsell, M. (2014). Fatigue and the anaesthetist. *Continuing Education in Anaesthesia. Critical Care & Pain*, *14* (1), 18-22. http://dx.doi.org/10.1093/bjaceaccp/mkt025	Level IV Grade D	Commentary/expert opinion	N/A	"Fatigue in health workers is associated with medical errors which may affect patient outcome" (Gregory & Edsell, 2014, p. 18). "Anaesthetists may be more sensitive to the effects of fatigue than other colleagues given the nature of their work and the need to maintain vigilance" (Gregory & Edsell, 2014, p. 18). "Disturbances to sleep balance and circadian rhythms are the main causes of fatigue in health workers" (Gregory & Edsell, 2014, p. 18).	"Organizational, educational, behavioural, and pharmacological strategies are available to ameliorate the effects of fatigue on performance" (Gregory & Edsell, 2014, p. 18).

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Howard, S. K., Gaba, D. M., Smith, B. E., Weinger, M. B., Herndon, C., Keshavacharya, S., & Rosekind, M. R. (2003). Simulation study of rested versus sleep-deprived anesthesiologists. *Anesthesiology*, 98(6), 1345-1355. http://dx.doi.org/10.1097/00000542-200306000-00008	Level III Grade C	Quasi-experimental case-control design	"Twelve anesthesia residents performed a 4-h anesthetic on a simulated patient the morning after two conditions of prior sleep: sleep-extended (EXT), in which subjects were allowed to arrive at work at 10:00 AM for 4 consecutive days, thus allowing an increase in nocturnal sleep time, and total sleep deprivation (DEP), in which subjects were awake at least 25 h" (Howard et al., 2003, p. 1345). "Psychomotor testing was performed at specified periods throughout the night in the DEP condition and at matched times during the simulation session in both conditions" (Howard et al., 2003, p. 1345). "Three types of vigilance probes were presented to subjects at random intervals as well as two clinical events" (Howard et al., 2003, p. 1345). "Task analysis and scoring of alertness were performed retrospectively from videotape" (Howard et al., 2003, p. 1345).	"The three major findings of this study are: 1. Many of the clinician subjects showed sleepy behaviors when sleep-deprived, and approximately one third fell asleep. This did not occur when they were sleep-extended. Other than the propensity to sleep, the task patterns and reported workload of subjects during simulated cases was not significantly affected by lack of sleep. 2. As a cohort, the performance of subjects on laboratory tests of psychomotor vigilance, memory, and mood showed progressive impairment during and after a night of sleep deprivation *versus* when they were sleep-extended. The nadir of performance on these tests was usually around 06:00-08:00, later than the traditionally circadian low point of 02:00-04:00. 3. As a cohort, subjects' performance on clinically relevant tasks and probes during simulated cases showed modest, if any, impairment when sleep deprived *versus* sleep-extended. Individuals in both sleep states made clinically relevant errors, with a trend toward more errors when sleep-deprived, but no definitive relationship to sleep deprivation could be demonstrated" (Howard et al., 2003, p. 1351-	Howard et al. (2003) recommend that "future investigations should also include anesthesiologists from different age groups to determine whether the work practices of experienced personnel also need to be modified" (p. 1354).

Article (APA Citation)	Level/Grade	Design	Sample/Data Collection	Findings	Recommendations
Sinha, A., Singh, A., & Tewari, A. (2013). The fatigued anesthesiologist: A threat to patient safety? *Journal of Anaesthesiology Clinical Pharmacy*, *29* (2), 151-159. http://dx.doi.org/10.4103/0970-9185.111657	Level IV Grade D	Expert opinion/recommendation	N/A	"Anesthesiologists need to be alert and healthy to render the best possible care to patients and themselves" (Sinha, Singh, & Tewari, 2013, p. 157).	Adoption of strategies to address and deal with sleep loss and resultant fatigue.
Tewari, A., Soliz, J., Billota, F., Garg, S., & Singh, H. (2011). Does our sleep debt affect patients' safety?. Indian Journal of Anaesthesia, 55(1), 12-17. http://dx.doi.org/10.4103/0019-5049.76572	Level IV Grade D	Commentary/expert opinion	N/A	"Decreased performance of motor and cognitive functions in a fatigued anaesthesiologist may result in impaired judgement, late and inadequate responses to clinical changes, poor communication and inadequate record keeping, all of which affect the patient safety, showing without doubt the association of sleep debt to the adverse events and critical incidents" (Tewari et al., 2011, p. 12).	
Williamson, A. M., & Feyer, A. (2000). Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication. *Occupational and Environmental Medicine* , 57, 649-655. http://dx.doi.org/10.1136/oem.57.10.649	Level IB Grade A	Cross over randomized control design	Convenience sample of 39 subjects; 30 transport industry employees and nine from the Australian army (Williamson & Feyer, 2000).	"After 17-19 hours without sleep, corresponding to 2230 and 0100, performance on some tests was equivalent or worse than that of a BAC of 0.05%" (Williamson & Feyer, 2000, p. 649). "After longer periods without sleep, performance reached levels equivalent to the maximum alcohol dose given to subjects (BAC of 0.1%)" (Williamson & Feyer, 2000, p. 649).	"Sleep is needed after the end of a day if adverse effects on performance are to be avoided" (Williamson & Feyer, 2000, p. 654).

APPENDIX C – Logic Model

Inputs (what resources you have)	Activities (what you will do)	Outputs (what you will produce)	Outcomes (what you will achieve)		
			Initial	Intermediate	Long-term
IRB approval **STEPS program** **SRNA commitment to participate** **physical meeting space in nursing building** **hard copies of consent forms and the Pittsburgh Sleep Quality Index (PSQI) for pretest and posttest**	**administer hard copy PSQI pretest to all program participants** **present STEPS to treatment group** **administer PSQI posttest to all program participants**	**mean pretest PSQI scores** **mean posttest PSQI scores** **t-tests used to evaluate pretest and posttest PSQI scores**	**SRNAs have increased awareness of prevalence of inadequate sleep** **SRNAs have increased awareness of impact of sleep difficulties** **SRNAs have increased awareness of healthy sleep habits and sleep hygiene**	**SRNAs improve sleep habits and sleep hygiene** **SRNAs have decreased incidence of sleep-related fatigue**	**SRNAs experience increased levels of energy and alertness** **SRNAs experience decreased daytime dysfunction** **SRNAs experience improved overall health and wellbeing** **decreased fatigue-related errors in patient care as SRNAs and as CRNAs**

APPENDIX D – IRB Approval Letter

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 17062604
PROJECT TITLE: Implementation of the Sleep Treatment and Education Program for Students (STEPS) in Student Registered Nurse Anesthetists
PROJECT TYPE: New Project
RESEARCHER(S): Nicolina Vaught
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Advanced Practice
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 06/27/2017 to 06/26/2018
Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX E – Permission to Use STEPS

RE: Letter Seeking Permission to Use STEPS

Brown, Franklin <franklin.brown@yale.edu>

Tue 2/7/2017 7:42 AM

To: Nicolina Vaught <Nicolina.Vaught@usm.edu>;

11 attachments (439 KB)

Pittsburgh Sleep Quality Index.doc; PSQI Scoring_standard.doc; SHAPES Scale.doc; SHAPES scoring.doc; Sleep Habits Survey.doc; Outline for STEPS _II.doc; Outline for STEPS.doc; STEPS presentation for students.ppt; Outline for STEPS.rtf; STEPS_2_narrative.doc; STEPS – II.ppt;

Hi Nicolina,

I have attached a bunch of stuff including:
The surveys and scoring instructions for the original study.
A slightly modified STEPS presentation powerpoint; and a STEPS II presentation I used, but never analyzed the findings.

Please feel free to use these for your research,

Franklin

Franklin C. Brown, Ph.D., ABPP
Yale University, Department of Neurology
800 Howard Ave, Lower Level
New Haven, CT 06519
Phone: 203-785-4086
Fax: 203-785-6901

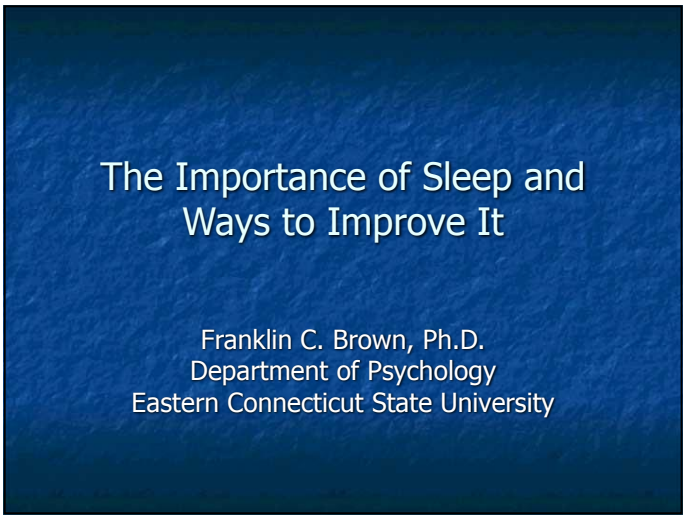
From: Nicolina Vaught [mailto:Nicolina.Vaught@usm.edu]
Sent: Monday, February 06, 2017 11:09 PM
To: Brown, Franklin
Subject: Letter Seeking Permission to Use STEPS

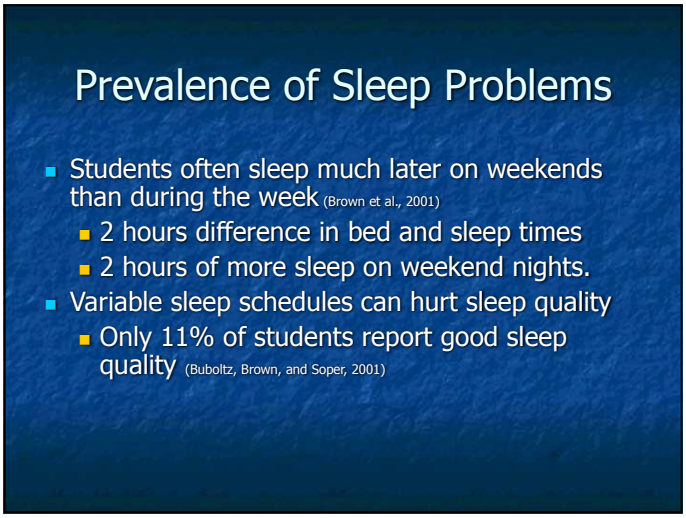
Dear Dr. Brown,

I am a Student Registered Nurse Anesthetist (SRNA) in pursuit of my Doctor of Nursing Practice (DNP) degree from The University of Southern Mississippi. Please see attached letter regarding replication of your published study "Development and Evaluation of the Sleep Treatment and Education Program for Students (STEPS)".

Sincerely,

Nicolina Vaught


The Importance of Sleep and Ways to Improve It
Franklin C. Brown, Ph.D.
Department of Psychology
Eastern Connecticut State University


Prevalence of Sleep Problems
Students often sleep much later on weekends than during the week (Brown et al., 2001)
2 hours difference in bed and sleep times
2 hours of more sleep on weekend nights.
Variable sleep schedules can hurt sleep quality
Only 11% of students report good sleep quality (Buboltz, Brown, and Soper, 2001)

Prevalence (Cont)

- Current college lifestyle hurts sleep quality
  - 1969-1989 Sleep decreased from 7.5 to 6.5 hours per night among students (Hicks & Pellegrini, 1991)
  - 2x rate of Delayed Sleep Phase Syndrome (Brown, et al. 2001; Lack, 1986)
- 1969-1989 Sleep decreased from 7.5 to 6.5 hours per night among students (Hicks & Pellegrini, 1991)

Impact of Sleep Difficulties

- Sleep Deprived Students Perform Worse but Rate Performance Better on Exam
- Less total sleep, especially dream sleep = worse test scores and grades.
- Sleep Difficulties among students are associated with (Pilcher, Ginter, & Sadowsky, 1997) :
  - Emotional Imbalance
  - Tension
  - Irritability
  - Depression
  - Attention and Concentration Difficulties
- Sleepiness is related to greater marijuana and alcohol abuse (Jean-Louis, Von Gizycki, Zizi, & Nunes, 1998)

Importance of Sleep (cont)

- Students with irregular schedules have: (Taub & Berger, 1974)
  - Low levels of energy
  - Depression and Irritability
  - Slower Reaction Times
  - Attention difficulties
  - More Social Problems

Sleep Hygiene Instructions

- Do not go to bed until you are drowsy.
- Wake up within an hour of your normal wake time everyday, including weekends
- Do not take naps
- Expose yourself to sunlight or other bright light in the morning
- Do not drink alcohol later than 2 hours prior to bedtime.

Sleep Hygiene Instructions (Cont)

- Do not consume caffeine within 6 hours of bedtime.
  - Learn which products and medications use caffeine.
- Do not smoke within 2 hours of bedtime
- Exercise Regularly
- Have a relaxing bedtime ritual
- Have a light snack before bedtime

Stimulus Control Instructions

- If possible, only use your bed for sleeping and/or sex.
- Lie down to sleep, only when sleepy
- Have a relaxing bedtime ritual
- If can not sleep within 15 minutes do something else until sleepy.

APPENDIX G – STEPS Oral Presentation

STEPS – II Narrative

Directions: Please read the following information verbatim. When speaking, look at the class at least once every thirty seconds to maintain their attention. Practice several times before you administer it to students. Do not read the references within the text aloud. If available, please give this with PowerPoint.

Introduction

Students are notorious for developing poor sleep habits while at college. This is supported by research indicating a much higher rate of sleep difficulties in students than in other adults [1-3]. For the next 15-20 minutes, I am going to tell you why it is important to have good sleep habits at college, the impact that sleep problems can have on your grades and life, how to have good sleep habits, and what to do if you are having problems with your sleep. The good news is that previous studies [4]found that similar presentations can improve student's sleep quality and prevent further sleep difficulties.

Prevalence (*Show slide with prevalence of sleep difficulties)*

Many students often state they crammed for hours the night before a test, complaining to professors they studied all night and still had trouble on the test. Students also complain about morning classes, avoiding them if possible, and then sleeping in on those days they do not need to get up. Research [2,3] indicates the average student goes to bed and awakes two hours later during the weekend than during the week. These sleep habits can lead to long-term sleep difficulties and poor sleep quality. In recent studies [2,3], about only 11% of college students reported good sleep quality, with the majority reported regular sleep difficulties. Compared to the average adult, twice as many students report symptoms of Delayed Sleep Phase Syndrome which consists of difficulty falling asleep and waking during scheduled time that interferes. This often results in less class attendance and lower grades.

Students often have misperceptions about what makes up good sleep habits and the impact of sleep difficulties which leads to long term sleep problems [5]. For example, many students mistakenly believe that the most important aspect of sleep is having eight hours each night. If they only get four hours of sleep one night, they believe they can make up for it by sleeping 12 hours the next night. This is not true and in a moment I will explain the reason. Along similar lines, some people believe that they should make sure they sleep eight hours each night and if they go to bed three hours later than normal, they should sleep three hours later the next day. This might make sense, but in reality it makes it harder to fall asleep at the normal bedtime the next night, can cause long-term sleep problems, and the impact of sleeping two hours later or longer than normal is just as bad as sleeping two hours less than normal.

Some people argue that perhaps sleep problems are simply part of the college lifestyle or to be expected in young adults. However, this is not the case. The average sleep length for college students has decline from about 7.5 hours of sleep in 1969 to 6.5 hours of sleep in 1989. That may not seem like a big difference to you, but it shows a steady decline in sleep habits over a 20 year period. Further, the college lifestyle itself seems to be impacting students sleep habits. One study found that without a sleep treatment intervention, students sleep quality became worse

over the semester, whereas those who took part in a sleep education program demonstrated similar sleep qualities as at the beginning of the semester [4].

Impact of Sleep Difficulties (*Show slide with same name)*

Okay, so you may be wondering, what is the big deal? All I have to do is drink some caffeine if I feel sleepy or go back to bed after class and everything will be fine. Other students think they perform just as well if they stay up all night studying, and will simply sleep after the class and feel fine. Wrong, you may think you feel fine and think you did well on the examination, but research shows otherwise. Two groups of students were given a test that measured critical thinking abilities and attention. One group of students stayed up all night before the test and the other group slept eight hours before the test. The group who stayed up all night rated their performance on the test higher than the students who did not stay up all night before the test. However, the students who did not stay up all night actually performed better on the exam [6]. This is probably why some of you believe you did fine on tests after staying up all night to study and are shocked when you get a lower grade than expected.

Many students believe if they only sleep 6 hours every night, they will adjust to it. But this simply is not true. People who chronically receive less than six hours of sleep per night may also have slower reaction times and thinking speed [7]. Both of which are important in academic life, athletics, and leisure pursuits, such as video games.

Sleep problems can even hurt your ability to learn new things and remember them later. Why does this occur? As it turns out, one of the purposes of sleep is to organize and store information learned during the day so it is easier to recall at a later time. This reorganization and memory storage appears to occur during dream sleep. Studies [8-10] have found that the amount of less dream sleep, the worse people perform on tests of knowledge learned recently.

In addition to grade specific problems, poor sleep quality can impact your life in general. Poor sleep quality in college students is related to depression, mood swings, irritability, concentration problems, and life dissatisfaction [11]. Habitually tired students tend to report greater frequencies of negative mood and more incidences of marijuana and alcohol use [12].

The timing of sleep is as important as the amount. Research found that students who shift their sleep schedules two hours earlier or later, or sleep two hours shorter or longer than normal have the same problems as those who sleep less than six hours. Namely, they report depressive symptoms, lower sociability scores, and more frequent concentration and attention difficulties [13].

Some people believe that they can adjust to unusual sleeping patterns. However, this is not true. Those with chronic irregular or sleep-wake cycles do not adjust to this, but continue to have low levels of energy, emotional distress, slower reaction times, and general decline in alertness [14]. In other words, if you have an option of sleeping later than normal to get eight hours or sleeping only six hours of sleep and sticking to your wake-up schedule, it is better to stick to your schedule. Attempting to make up for lost sleep is simply going to disrupt your sleep schedule and you will have trouble getting up at your normal time. Staying up late on the weekend is why many people hate Monday mornings, besides having to go to work or class.

These are just a few examples of the importance of regular sleep habits and good quality sleep. Many other examples and discoveries about the impact of sleep on our daily lives are being made all the time. The point is that sleep can clearly impact your lives in many areas. Now I am going to tell you about ways you can improve your sleep quality. The good news is that research indicates following these guidelines can improve sleep quality much more than medications [15,16].

Improving Sleep *(Sleep Hygiene Slide)*

I am now passing out 3 sheets of paper to each of you: a list of Sleep Hygiene Guidelines, or behaviors than can help or harm your sleep, a set of Stimulus Control Rules that can improve your sleep quality, and a list of substances that contain caffeine. If you will follow me on the lists I handed out, I will explain the rules and the reasons for them

To begin with, I am going to tell you about the Sleep Hygiene Guidelines. You probably will not be able to follow these rules everyday but following them most of the time should result in a noticeable improvement in your sleep quality.

1. Do not go to bed until you are drowsy.

   Reason: If you go to bed without being sleepy, you might toss and turn and worry about not falling asleep which makes your body more aroused and harder to fall asleep. This can become a habit and lead to problems fall asleep. Some people worry that waiting until feeling sleepy is not realistic since they have to awake at an early hour the next morning. But if you get up at the same time each day, your body will become tired enough that after several nights you will be able to fall asleep your scheduled bedtime.

2. Wake up within an hour of your normal wake-up time everyday, including weekends.

   Reason: This establishes a regular wake time, if you sleep late every time you go to bed late, you will find your bed and wake time shifting later each day. This is why people who sleep late during the weekend find it very difficult to wake Monday mornings. Some people believe sleeping late on the weekend can make up for "lost sleep." However, this is a not true. Once you lose your sleep, you cannot make up for it. If you try, you will find yourself feeling sleepy on those days you sleep late and on those days you do not get enough sleep. It is much better to get a consistent schedule and sleep approximately the same amount at the same time each night.

3. Do not take naps. If you do take a nap, limit it to less than an hour early in the afternoon.

   Reason: If you have difficulty falling asleep or go to bed late and wake up at a predetermined wake-up time you will naturally feel sleepy during the day. If you do not take a nap this will ensure that you will be able to fall asleep at your scheduled bedtime. If you take a long nap late in the day, you will lose your sleepiness and then have difficulty falling asleep at your scheduled bedtime.

4. Expose yourself to sunlight or other bright lights in the morning.

   Reason: You become and stay sleepy when your biological clock releases the hormone melatonin into your body; bright light stops the flow of melatonin. This is also why many people feel sleepy or depressed on cloudy days. Without exposure to bright light, many people's bodies do not completely stop the flow of melatonin. For artificial lights, you can buy an inexpensive 500 Watt Halogen "Shop" light at most stores that sell hardware. You do not need to look at the light directly, just have it shinning on or near you.

These first 4 rules will give you a consistent sleep cycle. Remember, if you stay up late and only get 5 hours sleep, sleeping later than normal may be just as detrimental than only getting five hours sleep. Further, sleeping late can mess up you sleep routine for several days as opposed to not getting enough sleep which will only bother you the day you feel tired.

5. Do not drink alcohol later than 2 hours before bedtime.

   Reason: Although alcohol I may help you relax and fall asleep, it leads to restless, non-restorative sleep and you will tend to wake up during the night as it wears off.

6. Do not consume caffeine after about 4 p.m. or within 6 hours prior to bedtime.

   Reason: Caffeine is a stimulant for all people even those who report they do not feel any different after digesting it, and can interfere with the natural sleep cycle. It is important for you to learn which foods, beverages, or medicines contain caffeine. The Substances with Caffeine Handout lists commonly used substances that contain caffeine. But, it does not include everything. So if you are having sleep difficulties, it is important that you check the ingredients of evening medications, beverages, or food that you ingest before bedtime.

7. Do not smoke within several hours before bedtime.

   Reason: Like caffeine, nicotine is a powerful physical stimulant. Your mind may feel more relaxed after a cigarette but you are more physically aroused. Higher physical arousal makes it more difficult to fall asleep. If you are looking for a reason to quit smoking and have sleep problems, this may be a good time to think about quitting.

8. Exercise regularly, but not within 2 hours of bedtime

   Reason: Exercise in the afternoon may be a good way to counter feelings of sleepiness because it wakes you up through physiological arousal. Exercise in the morning may help you become more alert. This same physiological arousal will keep you from falling asleep if you do it too close to your normal bedtime.

9. Make your bedroom easier to sleep in and have a bedtime ritual. Turn down the lights before bedtime, make sure your bed is comfortable, and minimize noise. Use earplugs if your neighbors are noisy.

   Reason: Uncomfortable sleeping environments raise your physiological arousal and decrease your chances of falling asleep or staying asleep.

10. If you usually snack before bedtime, have a light carbohydrate snack with a small amount of fluid, such as milk.

    Reason: Going to sleep hungry is not comfortable, at the same time you do not want to eat too much because it will cause you to get up and go to the bathroom in the middle of the night.

Next, I am going to tell you about the Stimulus Control Instructions. Many of you may find it hard to follow some of these instructions simply because you live in a dormitory and use your room for many things. However, if you do have difficulty staying asleep or falling asleep, it may be a good idea to look for other places you can study and do some of your other activities.

Stimulus Control Instructions

1. Do not use your bed or bedroom for any activity other than sleep or sex.

Reason: This will ensure you associate the bedroom with sleeping. If you begin to associate your bedroom with other activities, it will be difficult to fall asleep and/or stay asleep. You should not watch television, read, talk on the phone, worry, argue with your spouse, or eat in bed. This may be difficult to follow if you live in a dormitory. In this case, try to at least limit your activity on your bed to relaxing activities. If you are having a heated discussion on the phone, try not to do it while lying on your bed. If you are having sleep difficulties, you may want to start looking for places other than your dorm room to study and do assignments, such as in the library or in a study room in your dorm.

2. Lie down intending to sleep only when sleepy. If unable to fall asleep after about 15 minutes, get up and go into another room. If in a dormitory, get out of bed and do something non-sleep related, but that is relaxing. Return to bed only after you feel sleepy. If once in bed, or you re-awake at a later time and can not fall asleep within 15 minutes, get out of bed once more and repeat the procedure.

   Reason: If you go to bed when you are not sleepy, you will associate your bed with feeling frustrated about not being able to fall asleep.

3. Establish a set of regular pre-sleep routines that get you read for bed. Each night do the same routine in the same order.
   Reason:
   This will prepare your body for sleep and you will associate such activities with bedtime.

4. If you awake in the middle of the night and can not fall asleep within 15 minutes, get out of bed and do something else that is relaxing until you feel sleep again. Once you feel sleepy return to bed. If once again you can not fall asleep get out of bed until you feel sleepy again.

   Reason: Lying in bed trying to fall asleep can lead to worrying about sleep. Getting out of bed makes you only associated the bed with sleep.

Thank you for listening to this presentation. I hope you take it to heart and improve your sleep quality. At this point, you are welcome to ask any questions or bring up points to discuss the material presented.

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APPENDIX H – STEPS Handouts

Importance of Sleep and How to Make it Better

Sleep Problems in Students

- Almost 90% of students are dissatisfied with their sleep quality.
- Students have twice as many sleep problems than other adults.
- 6.5 Hours of Sleep
  (In 1969 students averaged 7.5 hours of sleep)
- Huge Variation in Sleep Schedules
  - Students often sleep several hours later and longer on weekends
    - Leads to Long-term Sleep Problems
    - Is just as bad as not enough sleep
    - People who vary their sleep schedule demonstrate just as many problems as people who do not get enough sleep.

Why is sleep so important?

- Muscles and Brain cells grow during sleep.
- Your immune system recharges during sleep.
- Odd sleep patterns or lack of sleep can lead to:
  Lower:
  ↓ Grades
  ↓ Attention
  ↓ Memory
  More:
  ↑ Mood Swings
  ↑ Anger
  ↑ Depression

There are certain habits that may help your sleep. Here are some of them:

1. Relax at least 30 minutes before bedtime.
2. Do not go to bed until you are drowsy.
3. Wake up within an hour of your normal wake-up time every day, including weekends.
4. Do not take naps. If you do take a nap, limit it to less than an hour early in the afternoon.
5. Expose yourself to sunlight or other bright lights in the morning.
6. Do not drink alcohol later than 2 hours before bedtime.
7. Do not consume caffeine after about 4 p.m. or within 6 hours prior to bedtime.
8. Do not smoke within several hours before bedtime.
9. Exercise regularly, but not within 2 hours of bedtime
10. Make your bedroom easier to sleep in and have a bedtime ritual. Turn down the lights before bedtime, make sure your bed is comfortable, and minimize noise. Use earplugs if your neighbors are noisy.
11. If you usually snack before bedtime, have a light carbohydrate snack with a small amount of fluid, such as milk.

What should I do if I have trouble falling asleep?

- Start relaxing an hour before bedtime.
- DO NOT go to bed until tired.
- Stop drinking beverages with Caffeine within 4 hours of bedtime.
- Go to bed and awake within the same 2 hours each day.
- Do not take Naps.
- Exercise on a regular basis.

What should I do if I think too much and can't sleep?

- Keep paper or a journal next to your bed and write out all the things you are thinking about.

What should I do if my roommate or dorm is too noisy?

- You can use soft, disposable earplugs which will reduce the noise.
- You can also buy sleep masks to cover your eyes if your roommate leaves the light on.

What should I do if I wake up and cannot fall asleep?

- If you cannot fall back to sleep within 20 minutes, get out of bed and do something else until you feel sleepy again.
- Wake up around the same time each day.
- Do not drink Alcohol within 2 hours of bedtime.

What if I like to stay up late on the weekend?

- Take classes that start later.
- Try and pick Friday to be your late night out, that will give you more time to resume your sleep schedule for Monday.
- Get outside and exercise Monday morning before class, sunshine and exercise can reset the biological sleep clock.

Do TV or Video Games Impact Sleep?

- Exciting TV and Video Games can make you more alert and less likely to sleep.

Please Turn Over for More Information about Sleep

Myths about Sleep

If I can't sleep, I'll just go to the doctor and take sleep medicine.

- In study after study, changing sleep habits was more effective than taking sleeping pills.
- Once you start taking pills, it is hard to sleep without them.
- Also, there can be serious side effects when taking sleep medications.
    - When you see an advertisement in a magazine, read all the fine print about possible side effects.

All this talk about sleep bothers me, I can stay up all night and do fine on a test the next day!

- Actually, researchers compared the test performance of students who stayed up all night with those who had 8 hours of sleep.
- The people who slept did MUCH better on the test even though the people who did not sleep THOUGHT they did better on the test.

Doesn't alcohol help me sleep better?

- You fall asleep faster, but it makes your sleep lighter and you will not feel rested.

Why is Sleep Important?

- Variable or Not Enough Sleep leads to:
    - Lower Grades
        - ↓ Attention, Reaction Times, Judgment
        - ↓ Knowledge of Newly Learned Materials
        - ↓ Grades
    - Bad Moods and Less Friends
        - ↑ Mood Swings
        - ↑ Anger
        - ↑ Depression
        - ↓ Social Interest

Improve Your Sleep Habits

- Have a Relaxing Bedtime Ritual
- Do NOT go to bed until drowsy
  - Stop tossing and turning in bed
- Do NOT take naps if you sleep poorly
  - Keeps you from being tired at night
- Try and wake up around same time
  - Sleeping 2 hours later than normal is as bad as not enough sleep.

Improve Your Sleep Depth

- You will sleep better if you:
  - Exercise on a daily basis
  - Do not drink alcohol within 2 hours before bedtime
    - You feel sleepy but wake up a lot more at night if you drink
  - Do not drink caffeine 4 hours before bedtime
    - You may not know it, but your sleep is more shallow after drinking caffeine.

Sleep Myths

- It's okay if I stay up all night, I can sleep more the next day, right?
  - WRONG! you CAN NOT make up for lost sleep, it just hurts your sleep schedule!

- It doesn't matter when I sleep, as long as I get 8 hours of sleep, right?
  - WRONG! Changing your sleep schedule is as bad as not getting enough sleep.

- If I can't fall asleep, I should stay in bed longer.
  - WRONG! This will just make you become frustrated and it is more difficult to sleep.

APPENDIX I – PSQI

Pittsburgh Sleep Quality Index (PSQI)

Name_____ Date _____

Instructions**:**
The following questions relate to your usual sleep habits during the **past month *only*.** Your answers should indicate the most accurate reply for the *majority* of days and nights in the past month. Please answer all the questions.

1. During the past month, when have you usually gone to bed at night? _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? _____

3. During the past month, when do you usually wake up in the morning? _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the hours you spend in bed.) _____

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you…

   (a) Cannot get to sleep within 30 minutes.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (b) Wake up in the middle of the night or early morning.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (c) Have to get up to use the bathroom.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (d) Cannot breathe comfortably.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (e) Cough or snore loudly

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (f) Feel too cold.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

   (g) Feel too hot.

   Not during the past month ____ | Less than once a week____ | Once or twice a week____ | Three or more times a week ____

(h) Had bad dreams.

Not during the past month ____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(i) Have pain.

Not during the past month ____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(j) Other reasons for sleep difficulties, please describe _____
_____

Not during the past month ____	Less than once a week____	Once or twice a week____	Three or more times a week ____

6. During the past month, how would you rate your sleep quality overall?

Very Good ____	Fairly Good____	Fairly Bad____	Very Bad ____

7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?

Not during the past month ____	Less than once a week____	Once or twice a week____	Three or more times a week ____

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activities?

Not during the past month ____	Less than once a week____	Once or twice a week____	Three or more times a week ____

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all ____ Slight Problem ____ Somewhat of a problem ____ Big Problem___

APPENDIX J – PSQI Scoring Instructions

SCORING FOR THE PITTSBURGH SLEEP QUALITY INDEX

The Pittsburgh Sleep Quality Index (PSQI) contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven (component) scores, each of which as a range of 0 – 3 points. In all cases, a score of "0" indicates no difficult, while a score of "3" indicates severe difficulty. The seven component scores are often then added to yield one "global" score, with a range of 0 – 21 points, "0" indicating no difficulty and "21" indicating severe difficulties in all areas.

Scoring proceeds as follows:

Component 1: Subjective Sleep Quality

Examine question #6 and assign scores as follows:

Response	Score
Very Good	0
Fairly Good	1
Fairly Bad	2
Very Bad	3

Component 1 Score: _____

Component 2: Sleep Latency

Examine Question # 2 and assign scores as follows:

Response	Score
≤ 15 minutes	0
16-30 minutes	1
31 – 60 minutes	2
>60 minutes	3

Question 2 Score: _____

Examine question #5a, and assign scores as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Question 5a score: _____

Add #2 score and #5a score as follows:

Sum of 2 and 5a: _____

Add component 2 score as follows:

Sum of #2 and #5a	Component 2 score
0	0
1-2	1
3-4	2
5-6	3

Component 2 score: _____

Component 3: Sleep duration

Examine question #4, and assign scores as follows:

Response	Component 3 score
> 7 hours	0
>6-7 hours	1
5-6 hours	2
< 5 hours	3

Component 3 score: _____

Component 4: Habitual sleep efficiency

1) Write the number of hours slept (question #4) here: _____

2) Calculate the number of hours spent in bed:

Getting up time (question #3): _____
- Bedtime (question #1): _____
Number of hours spent in bed: _____

3) Calculate habitual sleep efficiency as follows:

(Number of hours slept/ number of hours spent in bed) x 100 = Habitual Sleep efficiency)

(_____/_____) x 100 = _____ %

4) Assign component 4 scores as follows:

Habitual sleep efficiency %	Component 4 score
>85%	0
75-84%	1
65-74%	2
<65%	3

Component 4 score: _____

Component 5: Sleep disturbances

1) Examine questions # 5b – 5j, and assign scores for each question as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

#5b score _____
c score _____
d score _____
e score _____
f score _____
g score _____
h score _____
i score _____
j score _____

2) Add the scores for questions #5b – 5j: _____

3) Assign component 5 score as follows:

Sum of #5b – 5j	Component 5 score
0	0
1-9	1
10-18	2
19-27	3

Component 5 score: _____

Component 6: Use of sleeping medication

Examine question #7 and assign scores as follows:

Response	Component 6 score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Component 6 score: _____

Component 7: Daytime dysfunction

1) Examine question #8, and assign scores as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Question #8 score: _____

2) Examine question #9 and assign scores as follows:

Response	Score
No problem at all	0
Slight problem	1
Somewhat of a problem	2
Big problem	3

Question #9 score: _____

3) Add the scores for question #8 and #9: _____

4) Assign component 7 score as follows:

Sum of #8 and #9	Component 7 score
0	0
1-2	1
3-4	2
5-6	3

Component 7 score:_____

Global PSQI Score

Add the seven component scores together

Global PSQI Score:_____

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